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Do Specific Transitional Patterns of Antisocial Behavior during Adolescence Increase Risk for Problems in Young Adulthood?

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Abstract

Latent transition analysis was used to identify patterns and trajectories of antisocial behavior (ASB) and their association with young adult outcomes in a nationally representative sample of adolescents (*N* = 5,422; 53.9% female). Participants were on average 13.96 years of age (*SD*= 1.06) at wave 1 of the study. Latent class analysis identified four classes of ASB including a non-ASB class, an aggressive class, a petty theft class, and a serious ASB class. In general, youth who were classified as serious stable ASB were the most at risk for problematic functioning in young adulthood. Youth who escalated to more serious patterns of ASB or reduced involvement also were at greater risk of negative outcomes in young adulthood compared to stable non-ASB youth, although they generally fared better than youth involved in stable patterns of more serious ASB. Gender differences indicated that involvement in ASB was a greater risk factor for alcohol use among boys and a greater risk factor for depression among girls in young adulthood. Results are discussed in terms of the predictive validity of classes of ASB to functioning in young adulthood and the implications of this research for prevention efforts.

Keywords

Adolescence; Antisocial Behavior; Gender; Latent Transition Analyses; Young Adult Adjustment

Involvement in antisocial behavior (ASB; e.g., aggressive or delinquent behavior) during adolescence presents a complex picture. Some involvement may be normative and represents one way in which adolescents assert autonomy as they transition into adulthood (Frick & Viding, 2009). Prevalence estimates of ASB support this perspective; approximately 88% of youth report some level of ASB during adolescence (Moffitt, 1993; Moffitt & Caspi, 2001). On the other hand, ASB is a major health concern, and involvement

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in adolescence, even if limited, is associated with increased risk for concurrent problems and mental and physical health problems in adulthood (French & Conrad, 2005; Piquero, Daigle, Gibson, Piquero, & Tibbetts, 2007; Roisman, Aguilar, & Egeland, 2004). Thus, both normative and problematic patterns of ASB occur during adolescence (Frick & Viding, 2009; Moffitt, 1993).

Researchers have drawn on prevalence rates to suggest that specific types of ASB (e.g., property offenses, status offenses) are more common during adolescence, but studies have not directly tested whether involvement in particular patterns of ASB affect developmental trajectories of subsequent ASB involvement. Recent advances in person-centered statistical applications (e.g., Latent Transition Analysis [LTA]; Lanza, Flaherty, & Collins, 2003), make it possible to examine changing patterns of involvement in ASB during adolescence. Further, LTA can test the association of whether particular patterns and stability or transitions in those patterns of ASB result in differential outcomes in young adulthood. This information is critical to inform prevention efforts aimed both at reducing ASB and at the subsequent consequences of ASB involvement. This study examined whether specific transitional patterns of ASB in early adolescence were associated with increased risk of negative outcomes (e.g., high school dropout, depression, alcohol and drug problems, and criminal involvement) in early adulthood. Because research indicates gender differences in ASB course and outcomes (e.g., Bradshaw, Schaeffer, Petras, & Ialongo, 2010), we also examined whether ASB patterns, transitions, and outcomes differed for boys and girls.

Patterns of Antisocial Behavior

ASB may be distinguished by the type of behavior (e.g., aggression, theft) or the degree to which youth engage in a number of specific behaviors (i.e., high or low severity). Approaches that solely examine the level of involvement in ASB fail to recognize that there is variability in types of ASB (Wiesner & Windle, 2004). Researchers focused on identification of underlying typologies have generally identified four types of ASB involvement: a minimal involvement group, a group engaged in property-related delinquent behavior (e.g., stealing, property damage), an aggressive group, and a versatile group engaging in both aggressive and delinquent behavior (Angold & Costello, 2001; Connell, Cook, Aklin, Vanderploeg, & Brex, 2011; Frick et al., 1993; Soothill, Francis, Ackerley, & Humphreys, 2008). Many of these studies use samples with a history of involvement in the legal system or behavioral health symptoms, limiting the generalizability of findings. Research suggests that the types of behaviors limited to adolescence generally involve property crimes, petty theft, or status offenses as opposed to more diverse patterns of offending and more violent behaviors that are common amongst life-course ASB (Steffensmeier, Allan, Harer, & Streifel, 1989). Thus, one would expect that during adolescence most youth involved in ASB would be classified in a covert group, as opposed to a more serious versatile group or a violent offending group. Drawing on this research we expected to find similar patterns of ASB among adolescents within a national sample.

Transitions across Patterns of ASB

To date, few researchers have examined antisocial behavior by investigating patterns of transitions from one type of antisocial behavior to another. The majority of research in this area has focused on changes in rates of ASB and suggests adolescents who engage in ASB begin to desist from these behaviors by early adulthood (Moffitt, 1993; Nagin & Tremblay, 2001). Generally, this research indicates that a small percentage (about 5-6%) engage in serious and persistent behaviors across the life-span, and the majority of youth engage in some normative degree of involvement limited to adolescence (e.g., getting in a fight; Moffit, 1993; Stouthamer-Loeber, Wei, Loeber, & Masten, 2004).

LTA may uncover heterogeneity in types of ASB and assess whether changes in ASB follow a predictable pattern related to poorer outcomes in adolescence and early adulthood. Few studies, however, use LTA to examine stability and change in ASB during adolescence. One exception is Massoglia (2006) who utilized data from the National Youth Survey to examine changes in ASB from adolescence to adulthood. Four classes were identified: normative behavior (i.e., engagement in almost no antisocial behavior), predatory type behaviors (i.e., overt behaviors), drug-using behaviors, and pervasive behaviors (i.e., versatile offenders). Transitions were examined 10 years later in adulthood, though not during adolescence. Most individuals remained in the same ASB class, but when transitions occurred they tended to be to less serious forms of ASB. Similarly, Farrell and collegues have used growth modeling to understand how involvement in different patterns of ASB may unfold over time and suggests that aggressive behavior precedes the development of other antisocial behaviors throughout the course of adolescence (Farrell, Sullivan, Esposito, Meyer, & Valois, 2005). Taken together, previous research and theory suggests that many youth who engage in ASB during adolescence will first be involved in more adolescent-limited type behaviors (e.g., fighting, property offenses) and that only a subset of youth will transition from these behaviors into more serious and versatile ASB (Angold & Costello, 2001). Examining the predictability of these transitions and the relation of these transitions to later functioning in a nationally representative sample will be helpful in informing prevention efforts targeting adolescent ASB.

ASB and Young Adult Outcomes

ASB in adolescence has been associated with a range of adverse outcomes in young adulthood that include substance abuse, depression, criminal involvement, and lack of educational attainment (Bongers, Koot, van der Ende, Verhulst, 2008; Miller, Malone, Dodge, 2010). The significance that engagement in ASB during adolescence holds for problematic functioning in young adulthood may depend on the stability of ASB, as well as the type of ASB in which youth are engaged. ASB that is more severe or persistent may interfere with the development of key competencies that lead to problems in young adulthood (Bongers et al., 2008; Roisman et al., 2010). In contrast, other patterns of ASB (e.g., property offenses) or temporary involvement in ASB limited to adolescence may be more normative and not associated with maladjustment in young adulthood (Moffitt, 1993; Rutter, Kim-Cohen, & Maughan, 2006).

In general, research has not examined if different patterns of ASB during adolescence place youth more or less at risk for negative outcomes in young adulthood. One exception is Bongers and collegues (2008) who examined trajectories of aggression, opposition, property violations, and status violations and the relationship of these trajectories to functioning in young adulthood. Individuals with chronic, high-levels of opposition and status violations reported more impaired social functioning than individuals with chronic, high-levels of aggression and property violations. These results suggest preliminary evidence that different patterns of ASB and stability in those patterns may be differentially associated with young adult functioning.

Generally, the poorest outcomes in young adulthood are expected for ASB that is stable across the life-course (Moffitt, 2006; Thornberry, 2005). Yet, some research suggests that the types of problems evidenced in young adulthood may differ for ASB limited to adolescence, as opposed to stable ASB, with adolescent limited youth having a decreased risk of violent offending, but increased rates of substance use and mental health problems in young adulthood (Moffitt, 2006). Research further suggests that youth who engage in adolescent-limited ASB may evidence more problems in adulthood than youth who do not engage in ASB at all during adolescence (Moffitt et al., 2006; Odgers et al., 2008). Thus, we expected that youth involved in ASB that was serious and versatile, as well as marked by stability would report the most problems in functioning in adulthood compared with youth who were classified as non-ASB or who were involved in ASB at only one point in time.

Gender and ASB

The types of antisocial behaviors, trajectories of those behaviors, and subsequent outcomes may be gender-specific (Hagan & Foster, 2003). Adolescent boys generally are involved in greater levels of antisocial behavior than girls (Broidy et al., 2003; Chun & Mobley, 2010). During adolescence, girls show increases in covert or status offenses, such as theft, but continue to show low levels of ASB marked by aggression (Rutter, Giller, & Hagell, 1998). Girls are less likely to be classified as life-course persistent ASB, possibly because they are involved in less serious antisocial behavior than boys during adolescence (Angold & Costello, 2001; Soothill et al., 2008). This research suggests that the percentage of girls and boys involved in different patterns of ASB may differ with boys more often involved in serious or aggressive patterns of ASB and girls in covert or status offense behaviors.

Research on gender-specific transitions in ASB during adolescence has been mixed. A few earlier studies suggested that there may be more stability in ASB for boys than girls given that more boys have been classified as life-course delinquents and outnumber girls in the early-onset of behaviors (Kratzer & Hodgins, 1999; Silverthorn & Frick, 1999). Other researchers have found that although more boys are classified as life-course persistent than girls, there are not differences in the developmental progression of ASB for girls and boys during adolescence (Farrell et al., 2005; Lahey et al., 2006; Moffitt, Caspi, Rutter, & Silva, 2001). Based on this mixed research, we examined differences in transitions for boys and girls in order to shed light on these transition patterns over a one-year period in a national sample of youth.

Involvement in antisocial behavior during adolescence may differentially affect functioning in young adulthood for men and women (Keenan, Loeber, & Greene, 1999). There is considerable variability in research on gender differences in the relationship between ASB and differential functioning in young adulthood. Although some studies report no gender differences (Bradshaw et al., 2010; Fergusson, Horwood, & Ridder, 2005; Miller et al., 2010), others have reported significant gender differences (Bongers et al., 2008; Bor, McGee, Hayatbakhsh, Dean, & Najman, 2010). When differences were found, results indicated that ASB for boys was more likely associated with problems at work, substance abuse, and criminal justice involvement; whereas ASB for girls was associated with relationship problems, depression, and poorer physical health (Bor et al., 2010; Moffit et al., 2001). To date researchers have not specifically examined if different latent classes and transitions in those ASB classes manifest in different problematic outcomes for girls and boys in young adulthood. Based on research using a variable centered approach we expected that for girls, compared to boys, involvement in ASB would increase their risk for depression more so than other problems (e.g., criminal involvement) and for boys, relative to girls, involvement in ASB would have a stronger association with criminal involvement and substance use problems.

Hypotheses

This study makes an important contribution to the literature by using a national sample of youth to examine if specific types of ASB and transitions in those behaviors during adolescence, a critical developmental period, differentially place girls and boys at risk of problems 5 years later. We expected four patterns of antisocial behavior that included a non-ASB class, an aggressive class, a covert/theft class, and a serious (i.e., versatile) ASB class. We hypothesized that when transitions occurred over a one-year period one plausible transition pattern would be indicative of a pattern of escalation, whereby youth will first be involved in less serious patterns of offending before transitioning to more serious patterns of ASB. This pattern of escalation may be marked by transition from non-ASB to aggressive or covert/theft or transition from involvement in the aggressive or covert/theft class to the serious (i.e., versatile) ASB class. Furthermore, we hypothesized that youth classified as serious ASB at both time points would manifest the most problems in young adulthood, and that youth who were engaged in less serious forms of ASB at only one wave would look similar to youth who were classified as non-ASB at both waves. We also expected that boys would be classified more often as serious ASB and girls as non-ASB but did not make any hypotheses regarding transitions in ASB. Finally, we expected that boys and girls involved in ASB would differ in terms of how negative adjustment manifested, with boys classified in stable ASB classes more likely to report involvement with the criminal justice system and higher rates of substance use and girls with similar profiles reporting a greater prevalence of depression.

Methods

Sample

The data for the current study is from the first three waves of the National Longitudinal Study of Adolescent Health (Add Health) restricted data set. Add Health is a nationally

representative, school-based study that was designed to examine the effects of contextual influences and behaviors on functioning in young adulthood. The sample was limited to adolescents in the 7th - 9th grade cohorts who completed the first three waves of in-home interviews (N = 5,422) because early to middle adolescence is a particularly important time for the development of ASB. The first wave of in-home interviews occurred in 1994 (W1), wave 2 data (W2) was collected one year later, and wave 3 data (W3) was collected five years later. Participants were in 7th - 9th grade at W1 (M = 13.96 years of age, SD = 1.06) and ranged in age from 18 to 25 years old at W3 (M = 20.32 years of age, SD = 1.09). Youth were primarily European American (66.6%), with smaller percentages of African American (14.0%) and Latino Youth (11.4%). Further description of the sample and methods for Add Health is found in Bearman, Jones, and Udry (1997).

Measures

Antisocial behavior—Antisocial behavior at W1 and W2 was assessed with 13 items that reflected adolescents' involvement in a range of ASB that included overt and covert behaviors, as well as milder status offenses (e.g., damaging property, stealing, running away from home; Figure 1). The items used in the current study were chosen from the 15 items on the Add health survey designed to measure delinquency. We excluded two items ("lying to parents" and "being loud/rowdy in a public place") as these behaviors are not necessarily indicative of aggressive or delinquent behaviors and the prevalence of these behaviors was extremely high in the sample (above 50% of youth reported at W1). The items used in Add Health to measure ASB are adapted from the Health Behavior Questionnaire (Jessor, Donavan, & Costa, 1992) and are similar to items found on the Delinquency Scale (Elliot et al., 1985) and on the rule-breaking and aggressive behavior subscales on the Youth Self-Report (Achenbach, 1991), two of the most widely used instruments to measure antisocial behavior during adolescence. Participants were asked how often in the past 12 months they participated in a given ASB. Response options ranged from 0 times to 5 or more times. For the present study, we dichotomized each item to represent 0 (*no history of a specified behavior*) and 1 (*one or more times engaged in a specified behavior*). Other studies using Add Health have used similar strategies to account for the low prevalence of ASB and the extreme skewness and kurtosis of the items that violates assumptions of normality needed for the use of parametric statistics (Powell, Perreira, Harris, 2010). The same 13 items were used to reflect ASB at W1 and W2.

Young adult outcomes—We assessed several domains in young adulthood (W3) including criminal justice involvement, education, depressive symptoms, and substance use.

Criminal justice involvement: To assess criminal justice involvement in early adulthood, one item from W3 was used. The item asked participants to report if they had been arrested since they were 18. Responses were coded 0 (*youth had not been arrested*) or 1 (*arrested one or more times*). Roughly 15% of boys and 3.2% of girls reported criminal justice involvement as an adult.

Education: Educational attainment was measured with one item that reflected graduation from high school/GED attainment. This item was dummy coded, 0 (*No*) or 1 (*Yes*). Eighty-

five percent of boys and 88% of girls reported that they received their GED or high school diploma.

Depression: Depressive symptoms were assessed by participants report on a scale from 0 (*Never or rarely*) to 3 (*Most of the time*) on how often they experienced symptoms of depression within the past 7 days (CES-D; Radloff, 1977). In W3 of Add Health, 9 items reflected depression and included items such as "could not shake off the blues." Items were summed, with higher scores reflecting more depressive affect ($\alpha = .80$). We recoded the sum scores into a dichotomous outcome to reflect clinical levels of depression, with summed scores ranging from 0 to 9 coded as a 0 and summed scores above 10 coded as a 1 (Cheung, Liu, & Yip, 2007). Girls were more likely to report being depressed (26.8%) than boys (19.6%).

Substance use: Problems with alcohol and other drugs were assessed at W3. Problematic alcohol use was assessed with the 6-item alcohol related problems scale, which reflected failure to fulfill major role obligations at work, school, and in relationships (e.g., "during the past 12 months how many times have you had problems at school or work because you had been drinking?"), as well alcohol use which placed individuals in physically hazardous situations. Response options ranged from 0 (*Never*) to 4 (*5 or more times*). Responses were dichotomized to reflect problematic alcohol use in the past year, with scores indicating never coded as a *0* and once or more coded as a *1* (Thompson, Sims, Kingree, & Windle, 2008). On average, girls were less likely to report alcohol-related problems in the last year (23.5%) than boys (35.6%). Problems with illegal drugs were measured with the same 6 items used to assess problems with alcohol, except that participants responded in reference to problems from use of drugs. Responses were dichotomized to reflect no problems (*0*) in the past year or one or more problems (*1*). On average, boys reported more problems with drugs (19.0%) than girls (9.0%).

Controls—We controlled for W1 demographic covariates on ASB class membership. Specifically, we controlled for adolescents' age as indicated by grade, race/ethnicity (dummy coded with 'White' as the reference group), and poverty status. Poverty status was assessed using four parent-report items that asked if the parent received public assistance, Aid to Families with Dependent Children (AFDC), food stamps, or a housing subsidy. If parents answered yes to any of these items, they received a'*1*' indicating poverty status (Gerard & Buehler, 2004).

Analytic Plan

Analyses using Mplus 7.0 (Muthén & Muthén, 2010) included fitting latent class models and estimating a latent transition model that permitted variation in transition probabilities based on gender. Mplus uses a full information maximum likelihood estimation procedure (FIML) to estimate the model with missing data, reducing bias associated with other missing data methods (e.g., listwise deletion; Acock, 2005). Posterior class probabilities were exported to SPSS 20.0 to estimate the effect of latent transitions on young adult outcomes and gender differences in effects. All analyses used the Add health sampling weights.

To identify patterns of antisocial behavior during adolescence, the 13 antisocial behavior items were used and a series of latent class models were estimated with W1 and W2 of Add Health data. Latent class analysis identifies sub-groups (i.e., classes) of adolescents based upon similarity of responses to the antisocial behavior items (LCA; Lubke & Muthén, 2005). LCA provides estimates of class membership probabilities (e.g., frequency of different ASB classes) and item response probability estimates within class (Lanza et al., 2003). To evaluate the optimal class structure, a series of models were compared that represented different numbers of classes; for models with more than one class we also tested the effect of including a restricted non-ASB class where probability estimates were restricted to no involvement. We chose the latent class structure for W1 and W2 based upon statistical model fit information, as well as interpretability of classes. Model fit was compared using BIC, Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT), and model entropy. Models with low BIC and high entropy, as well as a significant LMR-LRT when classes are added indicate a better fit to the data (Muthén & Muthén, 2010).

Next, latent transition analysis (LTA) was used to examine changes in class membership from W1 to W2 of the study. Because the number of classes and overall pattern of item-response probabilities was similar in W1 and W2 analyses measurement parameters within latent classes were constrained to be equal across the two waves of the study (Bray, Lanza, & Collins, 2010). LTA relates the different classes at each time point to one another by estimating the probability that youth will transition from one class to another based on where adolescents are at W1. Gender-specific transition probabilities were estimated through model set-up procedures and Mplus Tech15. Item-response probabilities were fixed across gender to permit direct comparison in the transition probabilities and outcomes for like patterns of ASB.

Finally, latent transition class membership status based on class membership probabilities from the LTA model were exported to SPSS to examine the relation of ASB transition patterns from W1 to W2 to young adult outcomes at W3. Interaction variables were created to examine whether transition patterns differentially affected young adult outcomes for boys and girls. A series of five logistic regression models were estimated that regressed young adult outcomes on latent transition class and gender by latent transition class interactions. Covariates from the LTA model were included as controls. The stable non-ASB class was the reference class for comparisons. We estimated differences in young adult outcomes for several transition patterns, including those marked by stability, declining patterns of ASB, and increasing patterns of ASB. This technique of exporting probabilities to SPSS has been used in prior research and is the recommended approach for examining the effect of latent transitions on outcomes when using Mplus given high entropy (Muthén, personal communication, 2013; Rhebergen et al, 2012; Steuwe, Lanius, & Frewen, 2012)

Results

Descriptives

The mean number of antisocial behaviors youth engaged in during the past 12 months was 1.49 for girls and 2.20 for boys for W1 (s.d. = 2.1 & 2.4 behaviors, respectively) and 1.24 for girls and 1.69 for boys for W2 (s.d. = 1.9 & 2.2 behaviors, respectively). Involvement in

a physical fight was the most frequently endorsed item at W1 for both girls and boys (25.1%, 46.0%), followed by taking something from a store without paying for it, (20.5% and 26.6%, respectively). Descriptive results suggested that youth were engaging in more antisocial behaviors at W1 than W2 of the study. This decrease in ASB has been reported by others using the Add Health data set (e.g., Powell et al., 2010).

Patterns of ASB

Using W1 data, we identified four patterns of antisocial behavior based upon 13 items that reflected involvement in property crime, aggressive behaviors, stealing, status offenses, and selling drugs. A four class model fit the data well and was a significantly better fit than a three class model as indicated by a significant p-value, a decrease in BIC, and an increase in entropy. The four class model also provided a better fit than a five class model. The entropy for these models was .80. The final model produced four classes, consistent with our hypotheses: a non-ASB class (male: 40.0%, female: 60.1% [wave 1]) marked by low rates of involvement in any ASB; an aggressive class (male: 32.9%, female: 20.0% [wave 1]) who reported higher probabilities of engaging in fighting behaviors; a petty theft class (male: 15.5%, female: 14.5% [wave 1]) marked by a higher probability of shoplifting or stealing items worth less than $50; and a serious ASB class (male: 11.6%, female: 5.4% [wave 1]) who reported higher probabilities of involvement in all antisocial behaviors (Figure 1). The percentage of youth in each category differed slightly, at W2 with more youth being classified as non-ASB, and less youth being classified as aggressive, as well as serious ASB.

Multivariate regression analyses in the final LTA model examined covariate effects on ASB transitions. Gender was significantly associated with W1 class membership; males were more likely to be identified in the aggressive, petty theft, and serious ASB classes (O.R. = 2.57, CI [2.00-3.31]; O.R. = 1.62, CI [1.23-2.14]; and O.R. = 3.37, CI [2.49-4.56], respectively). Older youth were less likely to be identified in the aggressive class at W1 (O.R. = 0.84, CI [0.740.96]) but more likely to be identified in the serious ASB class at W1 (O.R. = 1.37, CI [1.111.68]) and less likely to be identified in the serious ASB class at W2 (O.R. = 0.70, CI [0.520.94]). Minority youth were more likely to be identified with ASB classes in W1. African American, Hispanic, and Other racial background were at elevated risk of membership in the aggressive class at W1 (O.R. = 2.37, CI [1.79-3.14]; O.R. = 2.05, CI [1.49-2.82]; and O.R. = 1.72, CI [1.16-2.55], respectively). Hispanic youth also had increased risk of membership in the serious ASB class (O.R. = 2.25, CI [1.40-3.64]) and the petty theft class (O.R. = 1.99, CI [1.412.82]) at W1. African American youth had lower risk of membership in either the aggressive (O.R. = 0.65, CI [0.46-0.94]) and the petty theft classes (O.R. = 0.55, CI [0.37-0.83]) at W2. Finally, poverty status was associated with risk of membership in the aggressive and serious classes at W1 (O.R. = 1.90, CI [1.41-2.56]; and O.R. = 2.19, CI [1.48-3.23], respectively).

Transitions in ASB

Table 1 depicts the latent transition probabilities (LTP) and transition probability odds ratios (TPOR) by gender. LTPs range from 0 to 1, with higher scores indicating a greater probability of class membership; TPORs are a ratio of LTPs reflecting the odd ratio of a male transitioning to a given class relative to a female within the four-possible classes – a

number greater than 1 indicates increased likelihood for males to make a transition. In general, stability in ASB patterns was highest for those initially identified in the Non-ASB class. Males demonstrated higher rates of escalation from Non-ASB to Aggressive followed by escalation to Petty Theft. Both males and females initially identified as Aggressive were nearly as likely to remain Aggressive or de-escalate to Non-ASB, though males had a slightly greater ratio in favor of stability in Aggression. Rates of stability in the Petty Theft class were relatively high for females, with minimal risk of escalation. For males, over half of those initially identified in this class transitioned out. Transition probability odds ratios indicated both de-escalation to Non-ASB, transition to Aggression, and escalation to Serious ASB relative to females. Finally, over half of males and females identified as Serious ASB de-escalated involvement. For females, this trajectory was equally likely to result in Aggression or Petty Theft. For Males, rates of de-escalation, compared to females, were highest for Aggression and Non-ASB.

ASB and Young Adult Outcomes

Separate hierarchical logistic regression models with the five different outcomes were estimated in SPSS to examine differences in young adult outcomes based on different transition probabilities during adolescence, as well as the interactive effect of gender and latent transition class. To simplify comparisons and because of the small number of participants in some of the transition classes we made five sets of comparisons to the stable non-ASB class. These comparison groups included (a) all stability classes (aggressive, theft, serious); (b) a transition class marked by escalation that included transitioning from non-ASB to aggressive, theft, or serious ASB and transitioning from theft or aggressive to serious ASB (c) a transition class marked by de-escalation that included transitioning from serious ASB to theft, aggressive, or non-ASB or transitioning from aggressive or theft ASB to non-ASB. Grade, race/ethnicity and poverty status also were included as covariates in all models (Contact Author for Results). Results are presented for the final step of the hierarchical logistic regression analyses, which included covariates, main effects of class and gender, and the interactive effect of gender and class with the stable non-ASB class serving as the reference condition (see Table 2). Follow-up logistic regression analyses to further explore predictive validity were also performed with the serious stable, aggressive stable, and theft stable classes serving as reference classes.

Results of these analyses indicated that stable patterns of ASB had significantly elevated rates of negative outcomes in young adulthood compared to stable non-ASB youth. Adolescents in the stable serious class were more likely to report criminal involvement and substance use problems and less likely to report graduating from high school compared to the non-ASB stable class. Further comparisons indicated that the stable serious class were significantly more likely to report substance use problems and criminal involvement than the aggressive stable class and significantly more likely to report high school drop-out than the theft stable class.

The aggressive ASB class was more likely to report depression, drug problems, and not graduating from high school as compared to the stable non-ASB youth. Interestingly, youth in the stable aggressive class had the highest odds of depression; follow-up analyses

revealed that these odds were significantly higher than youth in the serious stable and escalators class. Follow-up analyses also revealed that the stable aggressive class was significantly less likely to graduate from high school than the stable theft, escalator, and de-escalator classes; suggesting some evidence of differential outcomes in young adulthood depending on type of ASB involvement during adolescence. Finally, the stable theft class reported more depression, substance use problems, and criminal involvement than stable non-ASB youth but there were no differences in reports for dropping out of high school. Follow-up analyses with the stable theft group as the reference indicated that they were significantly more likely to report substance use problems than the aggressive stable class and the de-escalator class.

To examine if engagement in less stable patterns of ASB increased risk of maladjustment in young adulthood, we made two sets of comparisons. We compared youth who showed a pattern of de-escalation and youth who evidenced a pattern of escalation to youth in the stable non-ASB group. Differences indicated that youth evidencing a pattern of escalation were more likely to report substance use problems and criminal involvement than the stable non-ASB group; whereas youth evidencing a pattern of de-escalation were more likely to report not graduating from high school and higher rates of depression that the stable non-ASB group. It is interesting to note that the de-escalation group predominately consisted of youth involved in aggressive behavior at one point in time during the study and the escalation group predominately consisted of youth involved in theft at one point in time during the study.

A significant gender by latent transition class interaction effect was found for the outcomes of depression, criminal involvement, and alcohol use (Table 2). Specifically, girls in the escalator class when compared to boys in the escalator class were significantly more likely to report depression in comparison to youth in the stable non-ASB class. Follow-up analyses indicated that this association was not significant for boys but it was for girls. For criminal involvement, there also was a significant interaction for the stable theft class such that girls when compared to boys in that class were significantly more likely to report criminal involvement. Follow-up analyses indicated that when the sample was split by gender that being in the stable theft class for boys was not significantly associated with criminal involvement when compared to the stable non-ASB class but it was significantly associated for girls. For boys, classification in the aggressive stable and serious stable groups was more strongly associated with alcohol problems than for girls. Follow-up analyses indicated that for girls being in the stable serious group and the stable aggressive group was not significantly associated with alcohol use problems but it was for boys in comparison to the stable non-ASB group.

Discussion

The aim of this study was to gain a better understanding of ASB patterns during adolescence and the predictive validity of behavior patterns on young adult outcomes. Despite the extensive amount of research on antisocial behavior during adolescence, studies have not generally examined whether specific developmental patterns of adolescent ASB increased risk of poor adjustment in young adulthood. The current study found support for four

patterns of ASB, including a non-ASB group, an aggressive group, a petty theft group, and a serious ASB group. Stability in the three ASB-involved classes was associated with increased risk for maladjustment in several domains in young adulthood. Less consistent involvement in ASB was generally less predictive of poor adjustment in young adulthood. Few gender differences in the impact of ASB during adolescence on young adult outcomes emerged, though those that emerged were in the areas of depression, alcohol use, and criminal involvement.

Patterns and Transitions among ASB

Findings extend previous research by using a nationally representative data set to reveal diverse patterns of ASB in both range and type of behaviors. Consistent with previous research on less representative samples, the overwhelming majority of youth were classified in either the stable non-ASB group or stable aggressive ASB group, which was marked by involvement in less serious aggressive behaviors. Fewer youth were classified in the petty theft group, which was marked by a higher probability of stealing than all other groups. The fewest number of youth were in the serious ASB class, a group characterized by higher probabilities of engaging in all antisocial behaviors except shoplifting. These identified groups are similar to classes found in previous research using community samples, samples of all boys, juvenile offenders, and those seeking clinical services (e.g., Connell et al., 2011; Frick et al., 1993; Soothill et al., 2008). It is important to note, however, that the aggressive group that we identified may differ from aggressive subgroups that have been identified in previous research, as those youth engaged in a wider range of more serious aggressive behaviors (e.g., used a weapon; Nock et al., 2006). Taken together, these patterns suggest that there is some specialization in types of ASB, as well as differences in the range of behaviors.

Analyses revealed differences in the number of girls and boys in different ASB classes. Consistent with existing research (e.g., Odgers et al., 2008), a higher percentage of girls were identified in the non-ASB class, and a higher percentage of boys were identified in the serious ASB class at both W1 and W2. Boys also appeared to be more likely to be classified in the aggressive group than girls, a finding consistent with previous research that female adolescents are less likely to engage in overtly aggressive behaviors (Lahey et al., 2006). Boys were also slightly more likely to be classified in the petty theft class at W1, a finding contrary to expectations that girls primary type of offending involves covert behaviors such as stealing (Rutter et al., 1998). It is interesting to note, that at W2 girls were more likely to be in the petty theft class by a small fraction (1%) suggesting that perhaps as female adolescents age they begin to be involved in more stereotypical offending patterns. This is one of the few studies to estimate latent class ASB models by gender and thus future research is needed for replication.

This study contributes to the literature by using a latent transition approach to examine gender differences in adolescent transition patterns in ASB and their relation to adjustment in early adulthood. This innovative approach allows us to understand if ASB transitions follow a predictable path or if these behaviors are marked predominately by stability. Our results suggested that the overwhelming pattern was stability in ASB, particularly for the

non-ASB class and for girls, suggesting that although girls are less likely to be classified as serious ASB that once involved in ASB they are more likely to show stability in these behaviors. Consistent with past research (e.g., Odgers et al., 2008), relatively few boys or girls followed a stable pattern of serious ASB involvement. The predominant pattern of movement reflected decreased involvement in ASB over the one-year period. Youth who did increase ASB involvement over time were more likely to transition from non-ASB to theft, rather than to aggression, somewhat contrary to past research that aggression is central to the emergence of antisocial behaviors (Farrell et al., 2005). Of note, however, youth in the non-ASB class may have had limited involvement in some antisocial activities, and inspection of item response probabilities suggests this was most likely aggressive in nature (e.g., group fight, Figure 1). Furthermore, it appeared that it was more common to move from the aggressive group to the serious group than the petty theft group to the serious group. Findings also indicated that there may have been more stability in the theft class when compared to the aggressive class, particularly for girls. Theft behaviors may be a qualitatively distinct way of displaying ASB that are not indicative of a sequential pathway through which youth become more involved in versatile patterns of offending.

ASB Transitions and Youth Adult Outcomes

Results were consistent with the concepts of equifinality and multifinality as applied to developmental trajectories and subsequent outcomes associated with ASB (e.g., Cicchetti & Rogosch, 1996). Equifinality, for example, was evidenced by findings that a range of divergent ASB trajectories during adolescence each increased risk of particular adverse outcomes in young adulthood (e.g., regardless of ASB trajectory, all patterns increased risk of drug problems relative to stable non-ASB; similarly, divergent patterns increased risk of other various poor outcomes). With respect to multifinality, our findings demonstrated that particular developmental patterns of ASB over time were associated with a range of different, albeit correlated, negative adjustment outcomes. Taken, together, these findings underscore the notion that poor young adult outcomes may arise from a range of divergent patterns of ASB, and that particular developmental patterns may influence a range of negative outcomes – a notion that must inform intervention efforts targeting high risk ASB profiles and prevention of poor young adult outcomes.

There was some evidence of differential validity of the transition patterns on young adult outcomes, such that the stable aggressive group was particularly at risk for not graduating from high school and reporting depressive symptoms when compared to both the non-ASB group and the petty theft group. In fact, the stable aggressive group when compared to the stable non-ASB group evidenced the highest odds for depression even compared to the stable serious class, and this difference was significant. Furthermore, the stable petty theft group was more likely to report alcohol and drug problems than the stable non-ASB and aggressive groups. Post-hoc analyses revealed that the differences between the stable aggressive group and the stable theft group were statistically significant in regards to not graduating from high-school and substance use problems. Because aggressive behavior is an overt behavior, it may place youth particularly at risk for consequences in contexts where aggression is not tolerated, such as schools. This finding builds on past research that has linked aggression and difficulties during high school (French & Conrad, 2001). The findings

that those youth classified in the stable theft group tend to experience more problems with alcohol and drugs has not generally been found in past research with the exception of Windle (1990) who found property offenses (e.g., petty theft behaviors) were more strongly correlated with substance use in adulthood than aggressive offenses. Differences in functioning between the aggressive and theft stability classes provide support for using a latent transition approach to uncover differential predictive validity of ASB.

The latent transition approach used in the current study allowed us to examine the association between patterns of de-escalation and escalation with young adult outcomes. This approach has generally not been used in previous research and in this study provided a better understanding of the differential effects that stable versus inconsistent involvement in ASB has on adjustment. Findings suggested that youth who showed either a pattern of de-escalation or escalation over a one-year period were generally less at risk for negative outcomes in young adulthood than those youth who showed patterns of stable ASB at both waves. A few important caveats bear mentioning. First, youth engaged in both patterns of escalation and de-escalation were at elevated risk for negative outcomes when compared to youth classified as stable non-ASB. Specifically, youth evidencing patterns of escalation were at increased risk of alcohol and drug problems, as well as criminal involvement. Second, youth in the de-escalator class were significantly less likely to graduate from high school, more likely to report depression, and more likely to report drug problems than youth in the stable non-ASB class. The finding that less stable involvement in particular patterns of ASB are still associated with problematic functioning, particularly substance use and mental health problems is consistent with previous research indicating risks associated with time-limited ASB (Moffitt, 2006). Taken together, these findings provide some support that inconsistent involvement in ASB results in fewer negative consequences than stable ASB involvement but does suggest that even limited involvement may increase risk of negative outcomes and that a pattern of escalation during adolescence may have more adverse consequences than a pattern of de-escalation.

Results suggest some gender differences in the differential impact of ASB during adolescence on young adult outcomes. Consistent with past research, girls involved in ASB appeared to be at greater risk of depression-related outcomes, this was true specifically for girls classified as escalators as compared to boys evidencing the same pattern. Furthermore, for girls classification in the stable theft group was more of a risk factor for criminal involvement than boys in the stable theft group. It is interesting to note that the escalator group was predominately made up of youth that transitioned from either non-ASB to theft or theft to serious suggesting that for girls involvement in theft behaviors may be indicative of a more risky pattern of ASB. For boys, stability in ASB was more of a risk factor for alcohol problems than for girls boys, a finding consistent with previous research (Bongers et al., 2008; Moffitt et al., 2001).

Limitations and Future Directions

This study makes an important contribution to the literature linking patterns and transitions in ASB during adolescence with functioning in young adulthood. However, there are limitations. Most notably, we only looked at transitions of ASB over a one-year period in

adolescence. There may be higher rates of continuity in behaviors over several years when compared with a snapshot of behavior (McGloin, Sullivan, & Piquero, 2009), and considering only two time points may reflect temporary interruption of the behavior as opposed to cessation of ASB (Loeber & Coie, 2001). We chose to focus on this brief time span in adolescence as opposed to assessing behaviors into adulthood because we were interested in whether specific patterns of behavior and stability/instability in those patterns were more normative or pathological at a time during adolescence when we generally see increases in ASB. Future research, however, should estimate ASB patterns at several time points during adolescence.

Findings also are limited by the range of ages represented at each time point. We controlled for age on class membership at W1 and W2 and we only included youth from the 7^{th} - 9^{th} grade cohorts. However, controlling for age may obscure developmental phenomenon in both the patterns of behaviors identified and the relationship of those patterns with young adult outcomes. This limitation may be a particular concern given that the add health data set utilizes a cohort-sequential design, with different cohorts (grades) represented at wave 1, which ultimately results in youth in 8^{th} and 9^{th} grades represented in both wave 1 and wave 2 of the study. This is often a problem when utilizing cohort-sequential data and is currently difficult to handle in a latent transition framework, particularly in the context of distal outcomes that do not overlap with respect to measurement timeframes. Follow-up analyses in Mplus did reveal that class probabilities were nearly identical for 7^{th}, 8^{th}, and 9^{th} graders at Wave 1 and that transition probabilities showed very little variability across ages suggesting that latent classes and transitions appeared relatively consistent across age and that controlling for age may be sufficient in these analyses, particularly given the focus of the paper was not on age differences.

Finally, we were unable to control for concurrent functioning in terms of depression, criminal involvement, and substance use during adolescence. Thus, it is possible that adolescents in the various ASB groups evidenced dysfunction in multiple domains during adolescence and that this dysfunction was simply carried over into young adulthood as opposed to a direct result of ASB patterns during adolescence. Future research would be strengthened if controls for young adult outcomes were incorporated as predictors in the latent transition models.

Despite limitations, this study uses a novel analytic approach with a nationally representative sample to more fully understand a critical topic in adolescent development - whether specific patterns and stability in patterns of ASB place youth at risk for problematic functioning in young adulthood. Future research should build on this study and examine transitions in ASB throughout adolescence and long-term adjustment into middle adulthood, as well as consider protective factors that decrease ASB and associated negative outcomes. This approach is critical for informing cost effective prevention programming targeting ASB.

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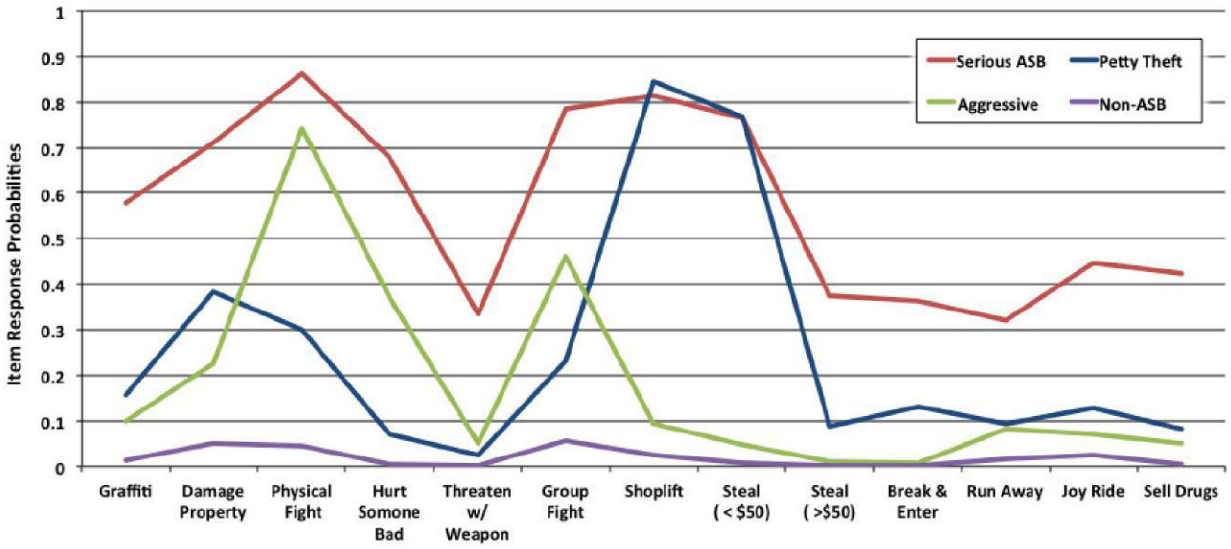

Figure 1.
Four-class LTA Model Item Response Probabilities (N =5,422)

Table 1

Transition probabilities (transition probability odds ratio) by gender (N =5,422)

	Wave 2									
	Girls					Boys				
	Non- ASB (70.3%)		**Aggressive (9.1%)**	**Petty Theft (16.6%)**	**Serious (4.0%)**		**Non-ASB (58.6%)**	**Aggressive (18.9%)**	**Petty Theft (15.3%)**	**Serious (7.1%)**
Wave 1	**Non-ASB:** 60.1%[a]	.93[b] (*ref*)	.01 (*ref*)	.06 (*ref*)	.00 (*ref*)	**Non-ASB:** 40.0%	.90 (*0.69*)[c]	.03 (*3.33*)	.07 (*1.19*)	.00 (*1.03*)
	Aggressive: 20.0%	.44 (*ref*)	.40 (*ref*)	.11 (*ref*)	.05 (*ref*)	**Aggressive:** 32.9%	.43 (*0.91*)	.43 (*1.15*)	.09 (*0.70*)	.00 (*0.87*)
	Petty Theft: 14.5%	.30 (*ref*)	.02 (*ref*)	.66 (*ref*)	.01 (*ref*)	**Petty Theft:** 15.5%	.37 (*1.64*)	.10 (*6.81*)	.49 (*0.49*)	.04 (*3.56*)
	Serious: 5.4%	.10 (*ref*)	.21 (*ref*)	.21 (*ref*)	.47 (*ref*)	**Serious:** 11.6%	.12 (*1.72*)	.27 (*1.37*)	.14 (*0.71*)	.44 (*0.86*)

[a] Indicates frequency of each class at Wave 1, by gender

[b] Indicates transition probability based on Wave 1 class membership, by gender

[c] Indicates the transitional probability odds ratio for males in reference to the four transition probabilities (within class) for females. Diagonal reflects probability of stable class membership relative to reference condition.

Table 2

Latent transitions and young adult outcomes from final step of hierarchical logistic regression analyses (N =4,933)

	High School Graduation		Depression		Alcohol Problems		Drug Problems		Criminal Involvement	
Base Rate	**87.0%**		**23.3%**		**29.9%**		**14.1%**		**8.9%**	
	Odds	**CI**	**Odds**	**CI**	**Odds**	**CI**	**Odds**	**CI**	**Odds**	**CI**
Gender (Male)	.92	.68-1.25	.66*	.33-.73	1.39*	1.14-1.69	2.05*	1.51-2.76	6.22*	3.99-9.67
ASB Transition Pattern										
Agg Stable (11.0%)	.41*	.26-.61	2.01*	1.45-2.79	1.09	73-1.63	2.04*	1.17-3.51	1.64	.63-4.25
Theft Stable (9.7%)	1.30	.77-2.21	1.42*	1.05-1.92	1.79*	1.36-2.42	3.57*	2.41-5.29	4.65*	2.56-8.45
Serious Stable (3.8%)	.32*	.17-.61	1.14	.63-2.05	1.23	.65-2.28	5.17*	2.72-9.83	4.07*	1.42-11.63
Escalators (5.9%)	.92	.49-1.72	1.23	.90-1.66	2.19*	1.48-3.23	3.70*	2.25-6.08	3.39*	1.48-7.75
De-Escalators (21.0%)	.53*	.37-.74	1.48*	1.14-1.94	1.30	.97-1.74	1.71*	1.10-2.67	1.75	.84-3.61
Gender X ASB Transition										
Agg Stable by Gender	.84	.49-1.44	.75	.48-1.17	1.93*	1.19-3.12	.82	.43-1.57	.89	.32-2.46
Theft Stable by Gender	.55	.27-1.12	.88	.54-1.43	1.32	.85-2.01	1.43	.85-2.42	.35*	.16-.72
Serious Stable by Gender	1.07	.47-2.42	1.36	.65-2.86	2.52*	1.20-5.28	79	.36-1.72	.90	.29-2.82
Escalators by Gender	.65	.29-1.47	.51*	.27-.96	.89	.53-1.52	.59	.31-1.15	.45	.17-1.18
De-Escalators by Gender	1.05	.66-1.67	.85	.59-1.23	1.19	.83-1.72	1.28	76-2.16	.97	.45-2.13

Note. Log-odds are represented for regression analyses with stable non-ASB (49%) as the reference class and

*indicates significantly < .05. All analyses controlled for race/ethnicity, grade, and poverty status.